MODULE DESCRIPTION FORM

Module Information					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**Basic learning**			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	ENG102				
ECTS Credits	6				
SWL (hr/sem)	051				
Module Level		1	**Semester of Delivery**		**2**
Administering Department			**College**	**Engineering College**	
Module Leader	**Assist. Lect Hasan Allawi**		**e-mail**	Hassan.as@uowa.edu.iq	
Module Leader's Acad. Title		**Assist. Lect**	**Module Leader's Qualification**		Msc
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		1/6/2023	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	Mathematics I	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	The aims of a mathematics module are to provide students with an understanding of mathematical concepts, skills, and techniques that can be applied to a range of real-world problems. This course aims to introduce the concepts of calculus, complex numbers, vectors, and linear algebra. Additionally, the module aims to prepare students for future academic and professional pursuits that require mathematical proficiency.
Module Learning Outcomes	By the end of this module the student should be able to: 1. Use asymptotic, first and second derivatives to graph functions. 2. Apply advanced rules/techniques of integration to compute integrals. sketch graphs of functions; approximation of functions. 3. Describe the polar coordinate system. 4. Convert from rectangular coordinates to polar coordinates. 5. Apply matrix techniques and elementary theory to problem in engineering. 6. Solve systems of linear equations and find the inverse of a matrix. 7. Perform the basic algebra operation of vectors. 8. Evaluate the scalar and vector product of two vectors. 9. Evaluate the gradient, divergence and curl of various scalar and vector fields. 10. Complex Numbers: Algebra of complex numbers, Solution of polynomial equations with complex roots, Argand Diagrams, Polar form of complex numbers, Exponential form of complex numbers, and Series expansion of trigonometric and exponential functions, De Moivre's theorem.
Indicative Contents	The Indicative Contents of a Mathematics module will depend on the level and scope of the course. However, some common topics that may be covered in a mathematics module include: 1. Arithmetic: Basic mathematical operations such as addition, subtraction, multiplication, and division. 2. Algebra: The study of mathematical symbols and the rules for manipulating these symbols to solve equations and represent real-world situations. 3. Geometry: The study of shapes, sizes, positions, and measurements of objects in space. 4. Calculus: The study of mathematical concepts such as limits, derivatives, and integrals. Overall, the Indicative Contents of a Mathematics module aims to provide students with a comprehensive understanding of mathematical concepts and their applications in various fields of study.

Learning and Teaching Strategies	
Strategies	

	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Structured SWL (h/sem)	78	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	150		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1 Week 2 Week 3	**Transcendental Functions:** Inverse Functions and Their Derivatives, Natural Logarithms, Exponential Functions, Indeterminate Forms and L'Hôpital's Rule, Inverse Trigonometric Functions, Hyperbolic Functions and their inverse.
Week 4 Week 5	**Integration Techniques:** Integration by Parts, Trigonometric Integrals, Trigonometric Substitutions, Partial Fractions, Improper Integrals.
Week 6	**Polar Coordinates:** Polar Coordinates system, Graphing Polar Coordinate Equations, Areas and Lengths in Polar Coordinates
Week 7 Week 8 Week 9	**Matrices and Determinants**: Definitions, Properties and operations, Determinant, Inverse of a matrix, Solution of linear system equations, Eigenvalues and Eigenvectors**.**
Week 10 Week 11 Week 12	**Vector Theory:** Three-Dimensional Coordinate Systems, Representation of vectors in space, unit vectors, Scalar Product, Vector Product, Lines and Planes in Space, Vector Function.
Week 13 Week 14 Week 15	**Complex Numbers:** Complex numbers and operations, Solution of quadratic equations, The argand diagram, Polar form of a complex number, Demoiver's theorem.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	George B. Thomas Jr., "CALCULUS", 14th Ed	Yes
Recommended Texts	1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Ed. 2. Schaum's Outline of College Mathematics, Fourth Edition. 3. Mary Attenborough, "Mathematics for Electrical Engineering and Computing", 1st Ed.	No
Websites	Topics in a Calculus -Wolfram Mathworld.	

Grading Scheme			
Group	**Grade**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.